

§ 29.1389

14 CFR Ch. I (1–1–11 Edition)

§ 29.1389 **Position light distribution and intensities.**

(a) *General.* The intensities prescribed in this section must be provided by new equipment with light covers and color filters in place. Intensities must be determined with the light source operating at a steady value equal to the average luminous output of the source at the normal operating voltage of the rotorcraft. The light distribution and intensity of each position light must meet the requirements of paragraph (b) of this section.

(b) *Forward and rear position lights.* The light distribution and intensities of forward and rear position lights must be expressed in terms of minimum intensities in the horizontal plane, minimum intensities in any vertical plane, and maximum intensities in overlapping beams, within dihedral angles, *L*, *R*, and *A*, and must meet the following requirements:

(1) *Intensities in the horizontal plane.* Each intensity in the horizontal plane (the plane containing the longitudinal axis of the rotorcraft and perpendicular to the plane of symmetry of the rotorcraft), must equal or exceed the values in § 29.1391.

(2) *Intensities in any vertical plane.* Each intensity in any vertical plane (the plane perpendicular to the horizontal plane) must equal or exceed the appropriate value in § 29.1393 where *I* is the minimum intensity prescribed in § 29.1391 for the corresponding angles in the horizontal plane.

(3) *Intensities in overlaps between adjacent signals.* No intensity in any overlap between adjacent signals may exceed the values in § 29.1395, except that higher intensities in overlaps may be used with the use of main beam intensities substantially greater than the minima specified in §§ 29.1391 and 29.1393 if the overlap intensities in relation to the main beam intensities do not adversely affect signal clarity.

§ 29.1391 **Minimum intensities in the horizontal plane of forward and rear position lights.**

Each position light intensity must equal or exceed the applicable values in the following table:

Dihedral angle (light included)	Angle from right or left of longitudinal axis, measured from dead ahead	Intensity (candles)
<i>L</i> and <i>R</i> (forward red and green).	0° to 10° .....	40
	10° to 20° .....	30
	20° to 110° .....	5
<i>A</i> (rear white) .....	110° to 180° .....	20

§ 29.1393 **Minimum intensities in any vertical plane of forward and rear position lights.**

Each position light intensity must equal or exceed the applicable values in the following table:

Angle above or below the horizontal plane	Intensity, <i>I</i>
0° .....	1.00
0° to 5° .....	.90
5° to 10° .....	.80
10° to 15° .....	.70
15° to 20° .....	.50
20° to 30° .....	.30
30° to 40° .....	.10
40° to 90° .....	.05

§ 29.1395 **Maximum intensities in overlapping beams of forward and rear position lights.**

No position light intensity may exceed the applicable values in the following table, except as provided in § 29.1389(b)(3).

Overlaps	Maximum intensity	
	Area A (candles)	Area B (candles)
Green in dihedral angle <i>L</i> .....	10	1
Red in dihedral angle <i>R</i> .....	10	1
Green in dihedral angle <i>A</i> .....	5	1
Red in dihedral angle <i>A</i> .....	5	1
Rear white in dihedral angle <i>L</i> ..	5	1
Rear white in dihedral angle <i>R</i> ..	5	1

Where—

(a) Area A includes all directions in the adjacent dihedral angle that pass through the light source and intersect the common boundary plane at more than 10 degrees but less than 20 degrees; and

(b) Area B includes all directions in the adjacent dihedral angle that pass through the light source and intersect the common boundary plane at more than 20 degrees.

§ 29.1397 **Color specifications.**

Each position light color must have the applicable International Commission on Illumination chromaticity coordinates as follows:

(a) *Aviation red*—

$y$  is not greater than 0.335; and  
 $z$  is not greater than 0.002.

(b) *Aviation green*—

$x$  is not greater than  $0.440 - 0.320y$ ;  
 $x$  is not greater than  $y - 0.170$ ; and  
 $y$  is not less than  $0.390 - 0.170x$ .

(c) *Aviation white*—

$x$  is not less than 0.300 and not greater than 0.540;

$y$  is not less than  $x - 0.040$  or  $y_c - 0.010$ , whichever is the smaller; and

$y$  is not greater than  $x + 0.020$  nor  $0.636 - 0.400x$ ;

Where  $Y_c$  is the  $y$  coordinate of the Planckian radiator for the value of  $x$  considered.

[Doc. No. 5084, 29 FR 16150, Dec. 3, 1964, as amended by Amdt. 29-7, 36 FR 12972, July 10, 1971]

**§ 29.1399 Riding light.**

(a) Each riding light required for water operation must be installed so that it can—

(1) Show a white light for at least two miles at night under clear atmospheric conditions; and

(2) Show a maximum practicable unbroken light with the rotorcraft on the water.

(b) Externally hung lights may be used.

**§ 29.1401 Anticollision light system.**

(a) *General*. If certification for night operation is requested, the rotorcraft must have an anticollision light system that—

(1) Consists of one or more approved anticollision lights located so that their emitted light will not impair the crew's vision or detract from the conspicuity of the position lights; and

(2) Meets the requirements of paragraphs (b) through (f) of this section.

(b) *Field of coverage*. The system must consist of enough lights to illuminate the vital areas around the rotorcraft, considering the physical configuration and flight characteristics of the rotorcraft. The field of coverage must extend in each direction within at least 30 degrees above and 30 degrees below the horizontal plane of the rotorcraft, except that there may be solid angles of obstructed visibility totaling not more than 0.5 steradians.

(c) *Flashing characteristics*. The arrangement of the system, that is, the number of light sources, beam width, speed of rotation, and other characteristics, must give an effective flash frequency of not less than 40, nor more than 100, cycles per minute. The effective flash frequency is the frequency at which the rotorcraft's complete anticollision light system is observed from a distance, and applies to each sector of light including any overlaps that exist when the system consists of more than one light source. In overlaps, flash frequencies may exceed 100, but not 180, cycles per minute.

(d) *Color*. Each anticollision light must be aviation red and must meet the applicable requirements of § 29.1397.

(e) *Light intensity*. The minimum light intensities in any vertical plane, measured with the red filter (if used) and expressed in terms of "effective" intensities must meet the requirements of paragraph (f) of this section. The following relation must be assumed:

$$I_e = \frac{\int_{t_1}^{t_2} I(t) dt}{0.2 + (t_2 - t_1)}$$

where:

$I_e$ =effective intensity (candles).

$I(t)$ =instantaneous intensity as a function of time.

$t_2 - t_1$ =flash time interval (seconds).

Normally, the maximum value of effective intensity is obtained when  $t_2$  and  $t_1$  are chosen so that the effective intensity is equal to the instantaneous intensity at  $t_2$  and  $t_1$ .

(f) *Minimum effective intensities for anticollision light*. Each anticollision light effective intensity must equal or exceed the applicable values in the following table:

Angle above or below the horizontal plane	Effective intensity (candles)
0° to 5° .....	150
5° to 10° .....	90
10° to 20° .....	30
20° to 30° .....	15

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